



THE UNIVERSITY OF
CHICAGO

DEPARTMENT OF STATISTICS

MASTER'S THESIS PRESENTATION

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GAN-MC: a Variance Reduction Tool for Derivatives Pricing

TUESDAY, November 8, 2022, at 2:00 PM

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ABSTRACT

We propose a parameter-free model for estimating the price or valuation of financial derivatives like options, forwards and futures using non-supervised learning networks and Monte Carlo. Although some arbitrage-based pricing formula performs greatly on derivatives pricing like BlackScholes on option pricing, generative model based Monte Carlo estimation will be more accurate and holds more generalizability when lack of training samples on derivatives, underlying asset's price dynamics are unknown or the no-arbitrage condition can not be solved analytically. We analyze the variance reduction feature of our model and to validate the potential value of the pricing model, we collect real world market derivatives data and show that our model outperforms other arbitragebased pricing models and nonparametric machine learning models. For comparison, we estimate the price of derivatives using Black-Scholes model, ordinary least squares, radial basis function networks, multilayer perception regression, projection pursuit regression and Monte Carlo only models.